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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/534,550	03/27/2000	Shau-Lin Shue	TS97-232B	4337

7590

07/03/2002

George O Saile
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Poughkeepsie, NY 12603

EXAMINER

OWENS, DOUGLAS W

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/534,550

Applicant(s)

SHUE ET AL.

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 March 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 6, 2002 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,907,772 to Iwasaki in view of US Patent No. 5,656,529 to Fukase.

Regarding claim 19, Iwasaki teaches a cylindrical shaped capacitor structure, comprising:

a bottom polysilicon shape (42A) on a first section of an underlying insulator layer (34), wherein the bottom polysilicon shape overlies and contacts a plug (38) disposed in an opening in the insulator layer; and

vertical conductive polysilicon shapes (Col. 5, lines 7-10 (42B)) on a second section of the underlying insulator layer and adjacent the bottom polysilicon shape.

Iwasaki does not explicitly teach uniformly doped polysilicon shapes, such as a polysilicon layer that is insitu doped. Iwasaki teaches "...a conductor film 42B such as a polysilicon film is deposited on the..." in lines 7 and 8 of column 5. Since the polysilicon film is conductive, it is obviously doped. Iwasaki is silent with respect to how the polysilicon film is doped. However, Iwasaki does not teach performing an implant step after depositing the polysilicon layer. It can be reasonably assumed that the polysilicon layer is doped before or during deposition since it is implied that the film is conductive when deposited. Insitu doping is one known method of doping polysilicon during deposition. One of ordinary skill in the art would have been required to select a known method of doping the polysilicon, such as insitu doping, as a matter of obvious design choice. An insitu doped polysilicon layer would have inherently been uniformly doped. Additionally, insitu doping would not have required an additional step be performed (an implant step), which would have helped keep the cost of manufacture to a minimum.

Iwasaki does not teach a capacitor dielectric layer and an upper electrode. It would have been obvious to one of ordinary skill in the art to provide these layers since they are critical to the operation of a capacitor.

Iwasaki does not teach an agglomerated metal silicide layer on the exposed portions of the cylindrical polysilicon shape. Fukase teaches a lower electrode for a capacitor having an agglomerated metal silicide layer (8') on the lower electrode. It would have been obvious to one of ordinary skill in the art to incorporate the teaching of Fukase into the device taught by Iwasaki since it is desirable to increase the effective surface area of capacitor electrodes, resulting in greater capacitance.

Regarding claim 20, Iwasaki teaches a capacitor structure, wherein the silicon layer comprises vertical polysilicon shapes connected by a horizontal polysilicon shape.

Regarding claim 21, neither Iwasaki nor Fukase teach a semiconductor device, wherein the silicide layer comprises titanium silicide, cobalt silicide, nickel silicide or platinum silicide. Fukase teaches a semiconductor device, wherein the metal silicide is tungsten silicide or other refractory silicide layers (Col. 6, lines 65-67). Fukase does not explicitly teach a silicide layer chosen from the group consisting of titanium silicide, cobalt silicide, nickel silicide, and platinum silicide. It would have been obvious to one of ordinary skill in the art to select a silicide from the cited group since they are known metal silicides and well suited for the intended use.

Response to Arguments

4. Applicant's arguments filed June 12, 2002 have been fully considered but they are not persuasive.

The applicant argues that Fukase teaches forming the agglomerated metal silicide on only the top surface of the structure. Fukase also teaches forming the agglomerated metal silicide on all exposed surfaces of the lower electrode. This feature can be seen in figures 6E-6G. The agglomerated metal silicide increases the effective surface area, which increases the capacitance of the device. It would have been obvious to also cover the exposed surfaces of the lower electrode in the device taught by Iwasaki because the same result of increase effective surface area can be expected.

The applicant argues that Iwasaki does not teach uniformly doped vertical shapes, and argues further that it is not known if the shapes are doped or intrinsic.

Iwasaki teaches "...a conductor film 42B such as a polysilicon film is deposited on the..." in lines 7 and 8 of column 5. Since the polysilicon film is conductive, it must be doped. Iwasaki is silent with respect to how the polysilicon film is doped. However, Iwasaki does not teach performing an implant step after depositing the polysilicon layer. It can be reasonably assumed that the polysilicon layer is doped before or during deposition since it is implied that the film is conductive when deposited. Insitu doping is one known method of doping polysilicon during deposition. One of ordinary skill in the art would have been required to select a known method of doping the polysilicon, such as insitu doping, as a matter of obvious design choice. An insitu doped polysilicon layer would have inherently been uniformly doped. Additionally, insitu doping would not have required an additional step be performed (an implant step), which would have helped keep the cost of manufacture to a minimum.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

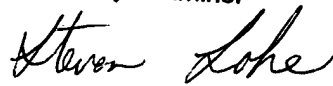
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DWO
June 27, 2002

Steven Loke
Primary Examiner

A handwritten signature in cursive script that reads "Steven Loke".